

POWERED BY **Dialog**

Powdered cheese substitute mfr - by mixing durum wheat powder, fats and flavourings
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Patent Family

Patent Number	Kind	Date	Application Number	Kind	Date	Week	Type
NL 7313478	A	19740423				197419	B
DE 2352197	A	19740509				197420	
FR 2203593	A	19740621				197434	
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Abstract:

NL 7313478 A

Powdered cheese substitutes, useful as replacements for the more costly and harder to produce Parmesan type cheeses for cooking, are made by mixing (a) a coarse 'durum' type wheat flour (semolina), (b) an oil or fat with m.pt. of 25-40 degrees ,C and (c) spices, flavouring and seasoning. The products generally contain 5-30 wt % of the durum wheat meal, opt. with fine powder flours, starches, soya protein, skim milk, etc. and about 20% of the oil or ft. The components are mixed homogeneously and allowed to stand, when the oil is absorbed by the durum wheat to give soft, coarse cheesy powder particles.

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(54) SIMULATED CHEESE PRODUCTS

- (71) We, L.D. SCHREIBER CHEESE CO., INC., a Corporation organised under the laws of the state of Wisconsin, United States of America, of 425 Pine Street, P.O. Box 610, Green Bay, Wisconsin, United States of America, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed to be particularly described in and by the following statement:-
- This invention relates to cheese-like products and to a method for direct fabrication of such products.
- Imitation cheese products have been produced from a variety of protein sources such as cottage cheese curd, milk solids, skim milk solids and the like. In many instances the above protein sources have been combined with minor amounts of the cheese being simulated and act as an extender therefor.
- In recent years, alkali or alkaline earth metal caseinates, which are valuable sources of protein, also have been used in the production of process cheese products as is illustrated by United States Patent No. 3,922,374 to Bell et al. However, such caseinates sometimes possess an objectionable odour and flavour which can override the intended flavor of the produced food products.
- Some relatively bland caseinates have been produced by heating a casein solution with an alkali metal or an alkaline earth metal salt in a manner which causes coagulation of the protein. The resulting coagulum is separated from a continuous liquid phase, and, after washing, is a substantially bland alkali or alkaline earth metal caseinate. Sodium caseinate, calcium caseinate and sodium-calcium caseinate have been employed heretofore for the production of simulated process cheese products. Nevertheless, a number of problems are inherent in the use of such materials. For example, in some instances sodium caseinate is unsatisfactory in imitation cheese products because such imitation cheese products have a tendency toward burning and puffing if baked or toasted, for example, on pizzas or on open-faced, toasted sandwiches. However, caseinates are often used as extenders in simulated dairy products so that smaller amounts of the more expensive natural ingredient can be utilized in the product.
- Another drawback of caseinates is that they are relatively expensive and tend to develop objectionable flavours and odours.
- Wet mass rennet casein (e.g., cottage cheese curd) has also been used to manufacture cheese products; however, it is a perishable item and suffers from the problems of spoilage, inconvenient handling and storage.
- German Patent Publication (Offenlegungsschrift) No. 23 42 299 discloses a cheese processing additive that can contain up to 20 weight percent of rennet casein and that can be added to crude cheese in an amount sufficient to supply 1 to 3 weight per cent of rennet casein. However, the rennet casein content of this processing additive is low, and a very large amount of a phosphate salt (33 to 100 weight percent, based on weight of rennet casein) is used to produce the additive.
- Accordingly, there has been a longstanding need for an inexpensive protein source which can be utilized as the principal protein source to produce a satisfactory food product and which can be used, if necessary, as the sole protein source in a cheese analog or cheese-like product. It has now been found that a non-cultured, cheese-like product can be prepared using dry, particulate rennet casein as the principal, or sole, protein source of the product, notwithstanding the known relatively low solubility of rennet casein in aqueous systems.

According to the invention, there is provided a non-cultured, simulated food product having generally the texture, body and taste characteristics of cheese which is a substantially homogeneous mass comprising at least 25 percent by weight previously dry but solvated edible rennet casein, an edible solvation agent present in an amount of 2 to 12 percent by weight of said rennet casein, water, a bland, edible lipid material selected from the group consisting of oil and fat, and sufficient quantities of suitable flavouring agents to impart the desired flavour.

According to another aspect of the invention there is provided a substantially homogeneous, aqueous, edible mass having cheese-like consistency which comprises at least 25 percent by weight of previously dry but solvated edible rennet casein, water, an edible solvation agent present in an amount of 2 to 12 percent by weight of the rennet casein, edible lipid material and suitable flavouring agents. The invention also extends to methods of producing such products. A colouring agent may also be present, and salt and other protein constituents can be added as desired.

The important factors for the direct fabrication of cheese analogs according to the present process are the relative amounts of the dry rennet casein, the solvation agent, and water. The manner in which these components are combined to constitute the mixture that is subjected to the heat treatment can be varied to provide various textures and products. The individual components can be premixed, mixed in the cooker, or combination of the foregoing procedures can be utilized. The nature of the heat treatment and agitation to which the foregoing components are subjected during processing also have a bearing on the obtained product.

In the process of this invention, the dry, particulate rennet casein is solvated or hydrated at an elevated temperature with sufficient water to produce a paste-like mass having no discernible unsolvated rennet casein particles present. The solvation is carried out with agitation in the presence of a solvation agent and at a temperature of 150°F. to 300°F., preferably at 190°F. to 205°F. The time period during which solvation of the rennet casein is completed is 30 seconds to 10 minutes, preferably about 2 to about 4 minutes.

The produced cheese analog or non-dairy but cheese-like product can be cast into loaves, sliced, or shaped into other packaging configurations as desired.

A non-cultured cheese analog embodying this invention is preferably a smooth, homogeneous plastic or non-plastic mass wherein the principal, and in many instances the sole, protein source for the cheese analog is previously dry but now solvated edible rennet casein, present in an amount of at least 25 percent by weight of the total product. The rennet casein content can be as high as 65 percent by weight, or higher, if desired, as long as the produced mass is substantially homogeneous and no visually observable, discrete rennet casein particles are present. Preferably the rennet casein content is 30 percent to 45 percent by weight.

Rennet casein is a commercially available edible milk protein product which contains more of the milk minerals than does acid casein. Typically, edible rennet casein is isolated by methods well known in the art from fresh pasteurized skim milk of relatively low fat content by precipitation with a rennet-type enzyme of the type used in cheesemaking. The precipitating enzyme can be of either animal or microbial origin. The precipitated rennet casein is then washed, pressed, dried, ground, sieved and blended to provide a substantially uniform, particulate product.

It is preferred to use a dry, particulate rennet casein having a lactose content of 0.1 percent to 0.3 percent by weight and having a particle size of approximately 30 mesh. Preferably, the ash content of the dry, particulate rennet casein that is used as the starting material is at least about 6 wt.-%, and more preferably about 7.5 wt.-%. One commercial source of suitable dry, particulate, edible rennet casein is New Zealand Milk Products, Inc., 6300 River Road, Rosemont, Illinois. A typical batch of this particular edible rennet casein has the following analysis:

		wt.-%	
	Moisture	11.0	
5	Protein ($N \times 6.38$)	80.6	5
	Milkfat	0.5	
	Lactose	0.1	
10	Mineral salts (ash)	7.8	10
		<hr/> 100.0	
15	pH	7.1	15
	Minerals and trace elements	wt.-%	
20	Calcium	2.7-3.0	20
	Phosphorus	1.3-1.4	
	Magnesium	0.10-0.12	
25	Sodium	0.01-0.05	25
	Potassium	0.01-0.04	
30	Iron	2-6 mg/kg	30

The term "solvated" as used herein and in the appended claims characterizes previously dry, edible rennet casein that has been hydrated at an elevated temperature and dispersed in an aqueous system as a solution or a gel.

35 The dry rennet casein has a number of advantages as the protein source. It is relatively inexpensive, and, because of its dry form, can be stored for long periods of time without spoilage or loss of flavor which is a problem with caseinates, cottage cheese curd, milk solids and other typical protein components of currently available process cheese products, many of which cannot be used as the sole protein source. However, heretofore it was not known how to produce stable aqueous systems having a relatively high rennet casein content, i.e., a rennet casein content in excess of about 20 weight percent. 40

Neither enzymes nor microorganisms are employed in the production of imitation, non-cultured, cheese-like products of this invention, thus the present invention provides a relatively simple, economical process of relatively short duration to produce a superior non-cultured, non-dairy, cheese-like product. The product of this invention can be made at a much lower cost than currently available imitation cheese products. 45

Furthermore, by direct processing, i.e., by the direct conversion of dry, particulate-edible rennet casein according to the method of this invention, a simulated non-cultured cheese-like product which closely resembles a natural cheese in body, texture and flavour characteristics can be obtained. Thus the present invention has provided a relatively simple, but economical and superior advance in the art of cheese analogs and their formulation. 50

The lipid material, i.e., the fat or oil, portion of the produced edible composition may be constituted by any edible fat or oil having a clean, bland flavour and preferably melting at a temperature of 50°F. to 100°F., more preferably at 90°F. to 95°F. The solid fat index of the oil at 92°F. preferably is less than 6, and more preferably about 0. The preferred oils or fats for the present purposes are animal fat such as milk fat, hydrogenated or partially hydrogenated vegetable oils such as coconut oil, corn oil, palm oil, soybean oil, cottonseed oil, safflower oil or mixtures such as soybean-cottonseed oil blends, and the like. The oil or fat portion constitutes at least 7 percent by weight, usually 7 to 55 percent by weight of the total product composition, and preferably from 20 to 30 percent by weight thereof, depending on the type of cheese analog that is produced. 55 60

Edible solvation agents such as the phosphate or citrate salts capable of sequestering the calcium present in the dry, particulate rennet casein are employed in amounts of 2 to 12 percent by weight of the rennet casein present, depending on the desired body and texture of the cheese-like product. However, if the solvation agent content is less than 2 percent, 65

incomplete solvation and excessive syneresis will occur. On the other hand, a solvation agent content in excess of 12 percent by weight produces no additional benefits.

At a relatively high edible solvation agent content, i.e., at 8 to 12 weight percent, based on the weight of rennet casein present, solvation provides a homogeneous plastic mass that has a smooth, uniform body like that of process cheese and is free flowing at elevated temperatures. At an intermediate edible solvation agent content of 4 to 8 weight percent, based on the weight of rennet casein present, a relatively long or semi-plastic body is obtained for the solvated rennet casein mass. Similarly, at a relatively low solvation agent content of 2 to 4 weight percent, based on the weight of the rennet casein present, a relatively short body, exhibiting some brittleness, is obtained.

Suitable phosphate-containing solvation agents include edible salts such as the alkali metal phosphates, e.g., disodium phosphate, trisodium phosphate, sodium hexametaphosphate, sodium tripolyphosphate, tetrasodium phosphate, dipotassium phosphate, monosodium diphosphate, disodium diphosphate, trisodium diphosphate, tetrasodium diphosphate and the like, the sodium aluminum phosphates, and mixtures thereof. A preferred phosphate-containing solvation agent for the production of simulated process cheese is a mixture of trisodium phosphate and disodium phosphate in a weight ratio of about 1:1.5, the mixture being present in an amount of 8 to 12 percent by weight of rennet casein, depending on the desired degree of plasticity for the body thereof. Another preferred solvation agent is an autogeneous mixture of an alkaline sodium aluminum phosphate having approximate empirical formula $\text{Na}_8\text{Al}_2(\text{OH})_2(\text{PO}_4)_4$ with about 30 weight percent of dibasic sodium phosphate. Suitable citrate-containing solvation agents include, for example, monosodium citrate, disodium citrate, trisodium citrate, and the like. Other solvation agents, e.g., chelating agents, sequestrants, or the like, can also be used.

Water is present in an amount of at least 35 to 300 percent, based on the amount of rennet casein present, and generally constitutes 30 to 60 percent by weight of the composition, depending upon the desired consistency. Water can be added during the premixing and cooking stages of the manufacturing process of this invention. The water that is present serves a two-fold purpose, namely, solvation of the rennet casein and control of consistency. If too much water is added, the resulting solvated mass becomes too fluid and no longer resembles the body of a cheese.

Starter, distillate, an acidulant, and salt are generally added for flavoring. The normal pH for the product obtained after cooking and without an acidulant present is approximately 7, therefore, an acidulant such as lactic acid or the like is used in flavoring the cheese-like product and at the same time lowers the pH of the final product to a desired pH value of 5.4 to 6.5, for a process cheese-like product preferably 5.5 to 5.8.

Since both dry, particulate rennet casein and edible oils are bland in flavour, it is necessary to add a small amount of flavouring agent, such as starter distillate, natural cheese flavour or artificial cheese flavour. Starter distillate is a standard commercial product which is widely used by dairy product manufacturers to add flavour to butter, margarine and cheese, and to fortify the flavour of cultured buttermilk and other dairy products, and is equally well suited for use in the present cheese-like compositions. Starter distillate is made by culturing a buttermilk starter to a rich flavour and aroma, and then distilling the volatile flavour constituents therefrom with steam and under very accurate controlled conditions. For the products of the present invention using a standard commercially available single-strength starter distillate as the principal flavouring agent, the desired flavour effect is achieved when the flavouring agent reaches a concentration of 0.3 to 0.5 percent by weight, preferably 0.35 to 0.4 percent by weight of the ultimate composition.

Alternatively, the chief component or components of starter distillate may be added in their pure form. For example, diacetyl (i.e., 2,3-butane-dione) is the chief flavour component of starter distillate and may be added alone, or together with the acidulant (e.g., lactic acid, citric acid, glucono-delta-lactone, hydrochloric acid, or the like) to achieve a flavouring agent concentration of from 10 to 1500 parts per million parts of the ultimate product. Other flavouring and/or acidifying agents that may be added are acetic acid, butyric acid, propionic acid, etc., i.e., $\text{C}_1\text{-C}_8$ carboxylic acids or mixtures thereof. In addition, artificial flavouring agents and/or spices may be used in appropriate amounts to supplement or replace the starter distillate components entirely. However, the preferred flavouring agent is starter distillate, which, in combination with desired levels of salt and acidulant, impart a pleasing flavour that closely approximates the flavour of cheese.

The method of making a simulated, non-cultured cheese-like product directly from rennet casein according to the practice of this invention can include premixing of the dry rennet casein, solvation agent, and water in an amount which constitutes a major portion of the total water content of the ultimately produced product, with or without the lipid material or flavouring agents present, or the ultimate food product constituents can be

mixed within the processing vessel. Thereafter, the produced admixture, containing a portion of the remaining water, is agitated and heated to a temperature of at least 150°F. and up to 300°F., preferably 190°F. to 205°F. at atmospheric pressure, and held at that temperature until the rennet casein present is solvated and a smooth mass is achieved, preferably for 30 seconds to 10 minutes, and more preferably for 2 to 4 minutes. At temperatures above the boiling point of water, processing can be carried out in a suitable pressure vessel. The remainder of the water to the admixture can be furnished via the steam and/or water separately introduced into the cooker before or during the cooking step, depending on the type of cooker that is being used. The produced smooth mass containing solvated rennet casein as the principal protein source is then formed into the desired product shape. In instances where the cooking is done by direct steam, the condensate obtained from the steam supplies the water necessary to bring the water content of the ultimate product to the desired value. If indirect heating is used, more water is added to the cooker during the cooking operation.

For cheese analogs having a relatively high solvated rennet casein content, i.e., above 50 percent by weight of the composition, it is preferable to add the dry rennet casein to hot water gradually over a period of time.

Premixing of the aforementioned ingredients is not always necessary, however. As pointed out hereinabove, all or a portion of the ingredients can be blended together in the cooker, if desired.

It is important to agitate the admixture of ingredients during heating. Moreover, severity of agitation at processing temperature can be used to adjust further the body of the ultimately produced cheese analog. For instance, a relatively high shear agitation is desirable for a plastic body such as that for a process cheese analog. On the other hand, for a cheese analog having a relatively short body, e.g., blue cheese or feta cheese, less severe agitation is normally used.

The following examples further illustrate this invention.

EXAMPLE 1:

Preparation of non-dairy premix

Dry, particulate edible rennet casein (about 297.5 lbs.) was combined in a blender with trisodium phosphate (about 11 lbs., 10 oz.), disodium phosphate (about 17 lbs., 12 oz.), salt (about 17 lbs., 6 oz.), process cheese colour (carotenal No. 73; about 350 ml.), water (about 308 lbs., 8 oz.), coconut oil (about 218 lbs.), lactic acid (about 12 lbs., 8 oz.; about 4625 ml.), starter distillate (about 3 lbs., 7 oz.; about 1544 ml.). The premix ingredients were then mixed for about 3 minutes to achieve a substantially uniform blend which can be used as a premix for the manufacture of cheese-like products.

EXAMPLE 2:

Preparation of simulated non-cultured process cheese product

An aliquot of pre-blended non-dairy premix (about 410 pounds) produced in accordance with the method of Example 1 was fed into a Rietz direct steam cooker to which had been previously added about 5 pounds of water. Steam feed to the cooker was partially turned on before the non-dairy premix was fed into the cooker. After the non-dairy premix was introduced into the cooker, the entire steam feed that was available was fed into the cooker. As soon as the mixture in the cooker began to back-splash, the steam feed was cut to about one-half of the original volumetric rate and the mixture was cooked at a temperature of about 195°F. The steam feed was then shut off and additional water (about 7.5 lbs.) was stirred into the mixture in the cooker together with sufficient acidulant to provide a pH of about 5.7 for the product. Thereafter, the cooked mixture was discharged into a suitable finish processing apparatus for packaging of the produced process cheese analog.

EXAMPLE 3:

Preparation of simulated American cheese product

Dry, particulate edible rennet casein (about 220 lbs.), sodium citrate (about 18 lbs.), trisodium phosphate (about 6 lbs.), salt (about 11.5 lbs.), and water (about 267 lbs.) were placed in a blender and mixed at ambient conditions until a substantially homogeneous blend was obtained. A mixture of partially hydrogenated cottonseed oil and partially hydrogenated soybean oil (about 160.5 lbs.) was then stirred into the previously produced blend and thereafter citric acid (about 9.7 lbs.), carotenal No. 73 colour (about 0.6 lbs.), starter distillate (about 2.5 lbs.), de-lactosed whey (about 1.9 lbs.), mustard (about 1.9 lbs.), and a vitamin-mineral premix (Hoffman-LaRoche TSD 72676, about 81 grams) were mixed into the produced blend and the mixing continued for about three minutes.

The resulting admixture was then barreled off into finished cook weight of about 450 lbs., ground, and fed into a Rietz direct steam cooker. Steam was then fed into the cooker until

the cooker contents reached a temperature of about 195°F. Thereafter the cooker contents was turned for about three minutes while being cooked at about this temperature.

The cooked contents of the Rietz direct steam cooker was then extruded into individually wrapped slices and cooled to ambient temperature. A simulated American cheese product having a pH of about 5.5 to 5.6 was obtained.

EXAMPLE 4:

An edible cheese analog

To water (about 26.4 kg.) in a blender were added disodium phosphate (about 2 kg.) and sodium chloride (about 4 kg.), and dissolved therein. Dry, particulate edible rennet casein (about 30.8 kg.) was thereafter stirred into the resulting solution followed by vegetable oil (about 25 kg.), flavouring agents, and glucono-delta-lactone (about 3 kg.). The resulting admixture was then thoroughly agitated until substantially homogeneous, fed to a direct steam cooker, and cooked therein at about 170°F. to about 180°F. for about three minutes.

A smooth, fluid mass was obtained, which was then filled into containers and rapidly cooled to ambient temperature. The ultimately obtained edible product was cheese-like in appearance and taste, and exhibited a relatively short, somewhat brittle body.

EXAMPLE 5:

Preparation of solvated rennet casein

Dry, particulate edible rennet casein was admixed with water and with disodium phosphate (DSP) as the solvation agent to provide one-kilogram batches that were individually processed in a double boiler capable of heating the contents thereof to a temperature of about 190°F. to about 200°F. (Runs A-C). In Runs D-F a portion of the rennet casein was added gradually during the course of heating to maximum temperature.

The boiler contents in each instance was then agitated with a portable agitator having a variable speed drive. Each batch was held at the maximum attainable boiler temperature for about 2 to 3 minutes while being agitated and then cooled. All batches were subjected to about the same degree of agitation.

The experimental results are compiled in Table 1, below.

TABLE I

Ingredient, wt.-%	Run					
	A	B	C	D	E	F
rennet casein	30	40	50	55	60	65
DSP	2.4	3.2	4	4.4	4.8	5.2
water	67.6	56.8	46	40.6	35.2	29.8

In all instances the obtained mass was completely homogeneous. As the rennet casein content was increased, the obtained mass became more translucent and the flowability of the mass upon cooling changed from that of a semi-solid paste to a hard mass.

EXAMPLE 6:

Solvation of rennet casein at varying solvation agent concentrations

Dry, particulate edible rennet casein was solvated in a manner similar to Example 5 with varying amounts of disodium phosphate (DSP) as the solvation agent. The body of the obtained mass was evaluated in the hot state in each instance. The experimental results are compiled in Table II, below.

TABLE II

	Ingredient, wt.-%	Run						
		G	H	I	J	K	L	
5	rennet casein	25	25	25	25	25	25	5
	water	74.5	74.25	74	73.5	73	72	
10	DSP ¹	0.5	0.75	1	1.5	2	3	10
	DSP ²	2	3	4	6	8	12	
	¹ based on total weight of composition							
15	² based on weight of rennet casein							15

In Run G, the obtained mass had the appearance of fresh curd; some particulate rennet casein was also observed to be present, though this would not appear if the ingredients were held at the temperature of the boiler for a greater length of time. Thus, Run G is not within the scope of the invention with the described operating parameters, but the particular combination of ingredients would be if these parameters were modified.

In Run H, the mass had a smooth body with some stretchiness.

In Run I, the mass had a stringy body.

In Run J, the mass exhibited a lower viscosity and less stringiness than the mass of Run I.

In Run K, the mass was quite thin and had a plastic, almost process cheese-like body with very little stringiness.

In Run L, the mass was very plastic and had a process cheese-like body.

The foregoing examples are intended as illustrative and are not to be taken as limiting.

WHAT WE CLAIM IS:

1. A non-cultured, simulated food product having generally the texture, body and taste characteristics of cheese which is a substantially homogeneous mass comprising at least 25 percent by weight previously dry but solvated edible rennet casein, an edible solvation agent present in an amount of 2 to 12 percent by weight of said rennet casein, water, a bland, edible lipid material selected from the group consisting of oil and fat, and sufficient quantities of suitable flavouring agents to impart the desired flavour.

2. The food product of claim 1 wherein said rennet casein is present in an amount of 25 percent to 65 percent by weight.

3. The food product of claim 1 wherein said rennet casein is present in an amount of 30 percent to 45 percent by weight.

4. The food product of claim 1 wherein said bland, edible lipid material is a hydrogenated vegetable oil present in an amount of at least 7 percent by weight of the composition.

5. The food product of claim 1 wherein said bland, edible lipid material is a hydrogenated vegetable oil present in an amount of 7 percent to 55 percent by weight of the composition.

6. The food product of claim 4 wherein said hydrogenated vegetable oil melts in the range of 50°F. to 100°F. and has a solid fat index at 92°F. of less than 6.

7. The food product of claim 1 wherein said bland, edible lipid material is a hydrogenated vegetable oil selected from the group consisting of hydrogenated coconut oil, corn oil, palm oil, soybean oil, cottonseed oil, safflower oil and mixtures thereof.

8. The food product of claim 1 wherein water is present in an amount of 30 percent to 60 percent by weight of the composition.

9. The food product of claim 1 wherein the flavouring agent is starter distillate.

10. The food product of claim 9 wherein said starter distillate is present in an amount of 0.3 percent to 0.5 percent by weight of said product.

11. The food product of claim 9 wherein the flavouring agent additionally comprises an acidulant in sufficient quantities to provide a product having a pH of 5.4 to 6.5.

12. The food product of claim 1 wherein the flavouring agent is selected from the group consisting of starter distillate, a C₁-C₈ carboxylic acid, and mixtures thereof.

13. The food product of claim 12 wherein said flavouring agent is present in an amount of 10 to 1500 parts per million parts of said product.

14. The food product of claim 13 wherein said flavouring agent additionally comprises sufficient acidulant to provide a product having a pH of 5.4 to 6.5.

15. The food product of claim 13 wherein said flavouring agent additionally comprises

sufficient acidulant to provide a product having a pH of 5.5 to 5.8.

16. The food product of claim 1 wherein said edible solvation agent is selected from the group consisting of an edible phosphate-containing solvation agent and an edible citrate-containing solvation agent.

5 17. The food product of claim 16 wherein said phosphate-containing solvation agent is 5 selected from the group consisting of disodium phosphate, trisodium phosphate, sodium hexametaphosphate, sodium tripolyphosphate, tetrasodium phosphate, the sodium aluminum phosphates, dipotassium phosphate, monosodium diphosphate, trisodium diphosphate, tetrasodium diphosphate, and mixtures thereof.

10 18. The food product of claim 16 wherein said citrate-containing solvation agent is 10 selected from the group consisting of monosodium citrate, disodium citrate, trisodium citrate, and mixtures thereof.

19. The food product of claim 17 wherein said solvation agent is a mixture of trisodium phosphate and disodium phosphate present in a respective weight ratio of about 1:1.5.

15 20. The food product of claim 19 wherein said trisodium phosphate-disodium 15 phosphate mixture is present in an amount of 8 to 12 percent by weight of rennet casein.

21. The food product of claim 1 wherein said solvated rennet casein has been obtained from dry particulate casein having a lactose content of 0.1 percent to 0.3 percent by weight, and a particle size of about 30 mesh.

20 22. A simulated, non-cultured process cheese-like food product having a body, texture 20 and eating quality of substantially that of process cheese which food product comprises 25 percent to 65 percent by weight previously dry but solvated rennet casein as the principal protein source, 7 percent to 55 percent by weight of an edible oil having a melting point of 50°F. to 100°F., an edible solvation agent in an amount of 8 percent to 12 percent by weight of said rennet casein, 0.3 percent to 0.5 percent by weight of starter distillate, 30 percent to 25 60 percent by weight of water, and sufficient acidulant to provide a pH of 5.5 to 5.8 in the food product.

23. The food product of claim 22 wherein said edible oil is a hydrogenated vegetable oil having a solid fat index at 92°F. of less than 6.

30 24. The food product of claim 22 wherein said edible oil is an animal fat. 30

25. The food product of claim 22 wherein said edible oil is a bland hydrogenated vegetable oil selected from the group consisting of hydrogenated coconut oil, corn oil, palm oil, soybean oil, cottonseed oil, safflower oil, and mixtures thereof.

35 26. The food product of claim 25 wherein said vegetable oil melts in the range of 90°F to 95°F and has a solid fat index at 92°F. of about 0. 35

27. The food product of claim 22 wherein said solvation agent to a mixture of trisodium phosphate and disodium phosphate present in a weight ratio of about 1:1.5.

40 28. The food product of claim 27 wherein said trisodium phosphate-disodium 40 phosphate solvation agent is present in an amount of 8 percent to 12 percent by weight of rennet casein.

29. A simulated non-cultured process cheese-like food product having generally a body, texture and eating quality of cheese comprising 25 percent to 65 percent by weight of previously dry but solvated rennet casein as the sole protein source, 7 percent to 55 percent by weight of a bland edible hydrogenated vegetable oil selected from the group consisting of 45 hydrogenated coconut oil, corn oil, palm oil, soybean oil, cottonseed oil, safflower oil, and 45 mixtures thereof, said oil melting at 90°F to 95°F and having a solid fat index at 92°F. of about 0; an edible solvation agent selected from the group consisting of disodium phosphate, trisodium phosphate, sodium hexametaphosphate, sodium tripolyphosphate, tetrasodium phosphate, the sodium aluminum phosphates, dipotassium phosphate, monosodium diphosphate, trisodium diphosphate, tetrasodium diphosphate and monoso- 50 dium citrate, disodium citrate and trisodium citrate and mixtures thereof, said solvation 50 agent being present in an amount of 8 to 12 percent by weight of said rennet casein; a flavouring agent selected from the group consisting of starter distillate, a C₁ to C₈ carboxylic acid, and mixtures thereof; and sufficient acidulant to provide a pH of 5.5 to 5.8 in the food 55 product. 55

30. The process of preparing a simulated non-cultured food product generally having the texture, body and taste characteristics of cheese by direct conversion of dry, particulate rennet casein, said process comprising mixing at least 25 percent by weight, based on the final composition, of said dry, particulate rennet casein with an edible solvation agent in an amount of 2 percent to 12 percent by weight, based on said rennet casein, with an edible 60 lipid material selected from the group consisting of a fat and an oil, and with sufficient 60 quantities of flavouring agents and acidulants to impart to said product the desired flavour and pH, agitating and heating the produced mixture to a temperature of 150°F. to 300°F., and maintaining the mixture, with agitation, at such temperature for a time period sufficient 65 to solvate the rennet casein that is present. 65

31. The process in accordance with claim 30 wherein the produced mixture is heated to a temperature of 190°F. to 205°F. and is maintained at such temperature for a time period of 30 seconds to 10 minutes.

5 32. The process in accordance with claim 30 wherein the produced mixture is heated to a temperature of 190°F. to 205°F. and is maintained at such temperature for a time period of 2 to 4 minutes. 5

33. A process of preparing a non-cultured, process cheese-like product by the direct conversion of dry, particulate rennet casein which comprises mixing 25 percent to 65 percent by weight, based on the final composition, of said dry, particulate rennet casein with 7 percent to 55 percent by weight, based on the final composition, of a bland, edible hydrogenated vegetable oil selected from the group consisting of coconut oil, corn oil, palm oil, soybean oil, cottonseed oil, safflower oil and mixtures thereof, with an edible solvation agent selected from the group consisting of disodium phosphate, trisodium phosphate, sodium hexametaphosphate, sodium tripolyphosphate, tetrasodium phosphate, the sodium aluminum phosphates, dipotassium phosphate, monosodium diphosphate, trisodium phosphate, tetrasodium diphosphate and monosodium citrate, disodium citrate and trisodium citrate, and mixtures thereof, said solvation agent being present in an amount of 2 percent to 12 percent by weight of said rennet casein, with 30 percent to 60 percent by weight, based on the final composition, of water, with a flavouring agent selected from the group consisting of starter distillate, a C₁ to C₈ carboxylic acid, and mixtures thereof and with sufficient acidulant to provide a product having a pH of 5.5 to 5.8, then agitating and heating the produced mixture to a temperature of 190°F. to 205°F., and maintaining the heated mixture at said temperature for 0.5 to 10 minutes, while the heated mixture is agitated, to produce the process cheese-like product. 10 15 20

25 34. The process of claim 33 wherein said flavouring agent is starter distillate, said starter distillate being present in a concentration of 0.3 to 0.5 percent by weight of the product. 25

35. The process of claim 33 wherein said flavouring agent is selected from the group consisting of diacetyl, a C₁ to C₈ carboxylic acid, and mixtures thereof, said flavouring agent being present in an amount of 10 to 1500 parts per million parts of the finished product. 30

36. The process of claim 33 wherein the acidulant is lactic acid. 30

37. The process of claim 33 wherein the acidulant is citric acid.

38. The process of claim 33 wherein said solvation agent is a mixture of trisodium phosphate and disodium phosphate present in a weight ratio of about 1:1.5, respectively.

39. A substantially homogeneous, aqueous, edible mass having cheese-like consistency which comprises at least 25 percent by weight of previously dry but solvated edible rennet casein, water, an edible solvation agent present in an amount of 2 to 12 percent by weight of the rennet casein, edible lipid material and suitable flavouring agents. 35

40. The edible mass in accordance with claim 39 wherein the rennet casein is present in an amount of 25 percent to 65 percent by weight.

41. The edible mass in accordance with claim 39 wherein the rennet casein is present in an amount of 30 percent to 45 percent by weight. 40

42. The edible mass in accordance with claim 39 wherein said solvation agent is a phosphate-containing solvation agent.

43. The edible mass in accordance with claim 42 wherein said phosphate-containing solvation agent comprises disodium phosphate. 45

44. A process of preparing a substantially homogeneous, aqueous, edible mass having a cheese-like consistency which comprises

50 admixing dry, particulate edible rennet casein, water, and a solvation agent so as to produce a substantially uniform admixture containing at least 25 percent by weight, based on the final composition, of rennet casein, 2 percent to 12 percent by weight of the rennet casein of an edible solvation agent, and water; 50

heating the resulting admixture, with agitation, to a temperature of 150°F. to 300°F.; and maintaining said admixture at said temperature, while said admixture is agitated, for a time period of 30 seconds to 10 minutes.

55 45. The process in accordance with claim 44 wherein said admixture contains 25 percent to 65 percent by weight, based on the final composition, of edible rennet casein. 55

46. The process in accordance with claim 44 wherein said admixture contains 30 to 45 percent by weight, based on the final composition, of edible rennet casein.

60 47. The process in accordance with claim 44 wherein said admixture is heated to a temperature of 190°F. to 205°F. 60

48. The process in accordance with claim 47 wherein said admixture is maintained at said temperature for a time period of 2 to 4 minutes.

49. The process in accordance with claim 44 wherein said solvation agent is an alkali metal phosphate.

65 50. The process in accordance with claim 49 wherein said alkali metal phosphate 65

comprises disodium phosphate.

51. A process for preparing a substantially homogeneous, aqueous, edible mass having a cheese-like consistency, substantially as described in any of Examples 2 to 6.

52. A simulated cheese food product which has been prepared by a process as claimed
5 in any of claims 30 to 38 and 44 to 51. 5

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